LIVING IN THE OAK OPENINGS

A GUIDE TO ONE OF THE WORLD’S LAST GREAT PLACES
Welcome to the third edition of the Living in the Oak Openings homeowner’s guide. For over a decade, this guide has been bringing the Oak Openings Region and all its natural wonders into the homes and schools of residents and neighbors. Its purpose has been, and continues to be, to inform, inspire and empower the people fortunate enough to live and travel within this unique landscape. With that in mind, the Green Ribbon Initiative, which is the collection of agencies working to protect and restore the Oak Openings, found it important to share with you the substantial new information and activities arising in the region since the second edition published in 2009.

One of the most notable changes you will find in this edition involves its maps: the Oak Openings Region appears to have doubled in size! This, however, is not exactly the case. For generations, the Oak Openings has attracted researchers and naturalists to explore its thousands of native plants and animals. Most of these researchers were from Ohio, and most studies ended arbitrarily at the state line, resulting in a perspective of the region that was very Ohio-centric. However, a broader look at Oak Openings plant communities, soils and geologic history reveal the true extent of this system and the full extent of the Green Ribbon Initiative’s focal area. This full extent of the Oak Openings is now reflected throughout this guide.

Additionally, all chapters have been updated to include the most relevant information, from changes in the listed status of a species to new research shaping the way we understand the system. Callout Boxes offer an in-depth look at important species, events and research. Expanded photo spreads give you a head start on identifying the great diversity of flora and fauna just outside your door. Finally, this guide empowers you to make a positive impact on the landscape through its new Call to Action Boxes and How to Save the Oak Openings chapter.

One factor that has not changed is the importance of this region to the health and survival of hundreds of rare and endangered species as well as the area’s residents. If you live or play within the Oak Openings, you are part of one of the rarest natural areas in the Midwest. If you read this guide, you are part of the team that has the power to preserve this gem. And if you accept your Call to Action, you become a part of the movement to revitalize our human and natural communities. Thank you for doing your part.

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Funds for the design of this publication were provided to The Nature Conservancy by the National Fish and Wildlife Foundation via the Great Lakes Restoration Initiative, and by Madhouse Creative, LLC.
INTRODUCTION

THE OAK OPENINGS: IT’S IN YOUR BACKYARD

BY ART WEBER

EVERY UNDEVELOPED ACRE, WHETHER A METROPARK OR A BACKYARD, CAN HOST RARE SPECIES

We call it the Oak Openings or, simply, the Oaks. Biologists call it oak savanna.

The Nature Conservancy has anointed it as “One of America’s Last Great Places,” putting it on par with Florida’s Everglades and the temperate rain forests of the Northwest as one of earth’s rarest habitats. This long and relatively narrow band of sandy soil just west of Toledo, Monroe, and Detroit that so many people call home is also home to dozens of rare species.

To be sure, the Oak Openings is not a land of mountaintop vistas and vast canyons. Its beauty is in the details, the incredible richness of species thriving in a rich variety of habitats.

The Oak Openings must have been a welcome sight to the early pioneers of northwest Ohio and southeast Michigan. After wallowing and hacking their way through the dense woods and mire of the Great Black Swamp—it could take nearly a week to traverse the 25 or so miles between Fremont and Perrysburg—the Oak Openings would have been like a dream come true to these early travelers. There, on the high sandy dunes, tall prairie grasses grew under an open canopy of widely spaced oak trees. They could easily zigzag their wagons through the dry open woodland without even having to cut a path.

Some of these early pioneers eyed the open woods and drooled at the prospect of easily cleared farmland. Their excitement was brief. The land was easy to clear, all right, and the sandy soil turned easily to the plow. But the soil was poor and unproductive, and farming was unprofitable.

A TIGER SWALLOWTAIL NECTARS ON DENSE BLAZING STAR

PRAIRIE DOCK AND DENSE BLAZING STAR

A WEBER
In between the sparsely wooded dunes and ridges are swales where the sand layer is thin, and water can stand year-round and suppress the growth of woody plants. Wet prairies formed there, dominated by sedges and grasses. These wet prairies and occasional small lakes were extensive enough that Native American hunters and gatherers could canoe uninterrupted for miles.

Wildflowers grew in such profusion in those early days that there are stories of farmers taking wagonloads of orchids to market with their produce.

Only the trained eye of a naturalist would now recognize much of the Oak Openings. Many of the wetlands have been drained and most of the towering oaks cut down. Dense, stunted second-growth forests now fill many of the “openings” that gave the area its name.

To the naturalist, though, the Oak Openings is a treasure to be nurtured and protected, a rich land dotted with rare jewels. In the early 1900s, Edwin Lincoln Moseley, naturalist and faculty member of Bowling Green State University, found more than 100 species of plants that were more abundant in the Oak Openings than anywhere else in Ohio. Years after Moseley, researchers continue to discover new species as well as rediscover species seen by Moseley but thought to have disappeared.

Today, within the Oak Openings, nearly one-third of all Ohio’s endangered plant species can be found, along with a host of rare animals, many of them birds and butterflies.

**WHAT IS THE OAK OPENINGS REGION?**

To many people, the Oak Openings means Oak Openings Preserve Metropark, largest of the Metroparks of the Toledo Area. The Oak Openings, though, is a much larger geologic region of which the Preserve is only a part.

The Oak Openings Region is a sandy five-mile-wide swath that stretches southward over 80 miles through Wayne and Monroe counties in Michigan and Lucas, Henry, Fulton and Wood counties in Ohio. As the last of the great mile-thick glacier—the Wisconsinan—receded from our region some 15,000 years ago, it left in its wake Lake Warren, one of the many stages of ancestral Lake Erie. Lake Warren built up sand bars and beaches in what is now the Oak Openings. They were left high and dry as the waters progressively dropped to today’s lake levels.

Wind whipped these sandy lake deposits into ridges and dunes. Uplands is a nearly impermeable layer of clay, cradling the water year round. In places the sand can be 50 feet thick, and in other places the underlying clay is nearly exposed. On the dunes where the sand is deep the conditions are arid and harsh, but ideal for the plants of the tallgrass prairie and the large spreading oaks.

It’s difficult to imagine the Oak Openings that existed as recently as the early 1900s. The labyrinth of ditches designed in the early 1900s changed the face of the Oak Openings forever. Water disappeared from the land and with it the waterfowl. If you doubt how wet the area once was, wait for a big rainstorm and drive some of the rural roads of the Oak Openings that traverse what was once wet prairie. Roads through these former wetlands can be rendered impassable in spite of the extensive drainage system.

The suppression of fire, both natural and otherwise, also dealt a blow to the Oaks. Fire historically suppressed the growth of many shrub and tree species, maintaining expansive openings, the very essence of the region, on the landscape.

Removing water and fire, it turned out, was like a one-two punch to the Oak Openings. Without these two natural interventions, remnants of the Oak Openings that haven’t already been altered by agriculture or suburban expansion have been largely overtaken by a denser oak forest, and the sun-loving species that characterized the Oak Openings have greatly declined. Though they are still hanging on, these sun-dependent rare plants and animals are being shaded out.

Only in the last three decades has the importance of fire and water to the Oak Openings been realized. Natural area agencies have been working to restore the landscape by selectively reintroducing these natural processes.

We’re also now understanding the greater importance of prudent management in the Oak Openings as a critical component to protecting and replenishing the waters of the Maumee River and beyond, into Lake Erie. Preservation and management that benefits a private well in Sylvania positively impacts our shared Lake Erie. Those shared benefits extend to such key concerns as ground water absorption, abatement of storm run-off, air quality, and carbon sequestration of wetlands, to name just a few.

Fortunately the land is resilient. We’ve learned that the Oak Openings responds well to prudent management. Good news for private landowners, too, is that the Oak Openings responds whether the management is on a large or small scale.

In a very real sense, everyone can be part of the fight to save the Oak Openings. So take a seat under a 400 year-old oak and contemplate your place in one of earth’s rarest habitats.

Read on—this is our backyard.
Much of the Oak Openings Region in northwest Ohio and southeast Michigan is former beach, reflecting higher lake levels in ancestral Lake Erie at the close of the last ice age.

The sand was reworked by the wind to form sand dunes over broad areas when water levels dropped. Also at about this time, rivers began to dig themselves into the landscape as glacial waters drained away.

The landforms representing the surface geology of the Oak Openings Region are subtle. Such subtly reflects past activity of glaciers and lake currents eroding away high points on the landscape and infilling low points. The unique plants and animals of the region reflect the area’s sandy soils and adaption to these subtle differences in topography.
As the glacier receded east uncovering lower elevation outlets, lake level dropped, forming the beaches of ancestral Lake Erie across northwest Ohio and southeast Michigan. As the glacier continued to recede eastwards, lake level dropped, forming the beaches of ancestral Lake Erie across northwest Ohio and southeast Michigan. As the glacier continued to recede eastwards, lake level dropped, forming the beaches of ancestral Lake Erie across northwest Ohio and southeast Michigan.

Features that were likely the source of the sand. Since formation of these sand dunes, the landscape remained relatively unchanged.

As the Ice margin (blue line) of the Huron-Erie lobe retreated to form the De/iance Moraine, the ice paused during the retreat to form the Maumee River floodplain. Glaciation is not expected for a very long time, thus rising lake levels shifting slowly east as winds from the west transport sand across their tops. Glaciation is not expected for a very long time, thus rising lake levels will not be a problem. Of more immediate concern though, is the falling water table. Glaciation is not expected for a very long time, thus rising lake levels will not be a problem. Of more immediate concern though, is the falling water table.

The processes that create oak savanna are largely abiotic factors of geology, water and fire. In the Oak Openings, sand features such as dunes, slacks and plains (i.e., low dense clay material that confines groundwater from quickly dissipation)

As precipitation arrives, the surface of the ground water, called the water table, rises, saturating the sand layer, and then falls as water flows out of the system. In many places, the water table will rise high enough that it periodically sits above the surface forming an ephemeral wetland. This annual process shapes oak savanna, as very few tree species are able to tolerate extreme wet followed by extreme dry.

Variance in soil organic material and water is the secret to the Oak Openings’ diversity of plant species, as a wide array of soil conditions are created. As water flows from higher ground into lower areas, it carries organic material from the dunes into the wetlands. A musk soil layer, or aquitard, is created that prolongs the time water is present at the surface, but allows the wetland soil to eventually dry in a typical summer. Where dunes locally supply water, fern-dominated swales form; where regional features (e.g., Lake Warren barrier ridge) supply water, wet prairie community arises.

Fire is the polish on the system. It reduces organic material such as leaf litter through combustion and kills the tops of woody plants that contribute to the organic material. Without fire, organic material continues to accumulate, eventually homogenizing the wide variety of soil conditions found among this geologic context.

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Future geologic events in the Oak Openings Region are expected to be minimal. With ongoing global climate change and changes in land use, rivers will likely be further entrenched in place from upky run-off events, and may shift in their channels due to higher intensity precipitation events. Projections for the future generally call for warmer conditions, which could lead to more drought. Drought in the region could lead to more bare sand patches with some minor reactivation of small sand dunes, such as is happening at the Girdham Road dunes in the Oak Openings Preserve Metropark. These dunes are dry and exposed, shifting slowly east as winds from the west transport sand across their tops. Glaciation is not expected for a very long time, thus rising lake levels will not be a problem. Of more immediate concern though, is the falling ground water level due to ditching of fields, the drainage of wetlands, and possibly global climate change. There is a strong relationship between vegetation and the surface geology, and while the latter is subtle, its impact is significant.

Oak savanna ecosystems are characterized by low densities of trees among grassland communities. The processes that create oak savanna are largely abiotic factors of geology, water and fire. In the Oak Openings, sand features such as dunes, slacks and plains (i.e., low dense clay material that confines groundwater from quickly dissipation).

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Five of the six natural plant communities in the region are considered globally rare.

The Oak Openings’ six primary natural plant communities are Black Oak/Lupine Barren, Mesic Sand Tallgrass Prairie, Midwest Sand Barren, Oak/Blueberry Forest, Great Lakes Pin Oak/Swamp White Oak Flatwoods and Twigrush Wet Prairie.

A plant community is an assemblage of species that interact with one another and their environment within a certain area. Environmental or abiotic factors such as climate, geology, hydrology, soils and topography are important in determining where plant communities occur.

Following are descriptions of natural communities characteristic of the Oak Openings. Several other communities, such as conifer forests, have been introduced by humans and are discussed briefly in other chapters.
Metropark have excellent examples of this community. Kitty Todd Nature Preserve and Oak Openings Preserve have quality examples of this community.

**Midwest Sand Barren**

Midwest Sand Barren is an open, dry habitat that is harsh—so harsh that trees are rare or absent. Bare sand is frequent and bitubocotous, or bowl-shaped areas of exposed sand, are not uncommon. The well-drained, sandy soils and open conditions make it very difficult for plants to survive. Many of the species growing in this habitat have adapted to the harsh conditions by covering leaves and stems with hairs to hold moisture and shade their surfaces. These desert-like conditions are ideal for the prickly pear cactus, the region’s only native cactus. Grasses and sedges are the common vegetation and include species such as spatulate-leaved sundew, twisted yellow-eyed-grass, grass-pink orchid, rose pogonia orchid and northern bog clubmoss, occur within the low sand flats of the community where pH is between 4 and 5. Kitty Todd Nature Preserve has quality examples of this community.

**Mesic Sand Tallgrass Prairie**

Mesic Sand Tallgrass Prairie is a globally vulnerable and is one of the rarest communities in the Oak Openings Region. It was the most common wetland community in the region, but because of development and fire suppression it is now reduced to small patches. Mesic Sand Tallgrass Prairie is seasonally flooded, holding water from late winter to mid-spring. This plant community occurs on sand flats between the sand dunes. Soils often have thick, dark surface horizons. Vegetation composition varies within the community due to slight changes in soil pH and moisture. Trees are scarce, but shrubs can be locally common. Shrubs include prairie willow, meadow-sweet, sheepleek, dogwoods and black chokecherry. Common grasses include big bluestem, little bluestem and Indian grass. Forbs include dense blazing star, collis-root, tall coreopsis, showy tick-trefoil, yellow wild indigo, Canada goldenrod, showy goldenrod and soapwort gentian. Species often growing in bogs, such as spatulate-leaved sundew, twisted yellow-eyed-grass, grass-pink orchid, rose pogonia orchid and northern bog clubmoss, occur within the low sand flats of the community where pH is between 4 and 5. Kitty Todd Nature Preserve has quality examples of this community.

**Twigrush Wet Prairie**

Twigrush Wet Prairie is unique to the Great Lakes. In Ohio, it is only known from the Oak Openings Region. In Michigan, this community may be called Lakeplain Wet Prairie, and is limited to lakeshore counties near Lake Erie and Saginaw Bay. Twigrush Wet Prairies once covered miles of islands before the construction of ditches that lowered the water table, hastening woody invasion. Today, small remnants are seasonally flooded with water levels reaching two or more feet deep from late fall to late spring. The seasonal ponding of water slows tree and shrub invasion and can form dense thickets. Shrubs include black chokecherry. Typically there is a layer of muck over the sand. This community was common and today it is the most frequent wetland community in the Oak Openings. The Mesic Sand Tallgrass Prairies and Twigrush Wet Prairies succeeded into this community where fire is suppressed and water levels are reduced.

**Great Lakes Pin Oak/Swamp White Oak Flatwoods**

Great Lakes Pin Oak/Swamp White Oak Flatwoods is a seasonally flooded, wet forest community. The tree canopy is dominated by pin oak and swamp white oak. The abundance of the herbaceous layer varies depending on water levels and the amount of sunlight. The most frequent plants in this layer include Canada bluejoint, common lake sedge, cinnamon fern, royal fern and foxtail-manna-grass. The diversity of this layer increases with the amount of sunlight reaching the ground. Shrubs are frequent and can form dense thickets. Shrubs include winterberry, swamp rose, spirea, dogwoods and black chokecherry. Typically there is a layer of muck over the sand. This community was common and today it is the most frequent wetland community in the Oak Openings. The Mesic Sand Tallgrass Prairies and Twigrush Wet Prairies succeeded into this community where fire is suppressed and water levels are reduced.
Since the earliest naturalist explored this area, the Oak Openings Region has been famous for the diversity and rarity of its local plant life.

The region has gained global attention, especially by The Nature Conservancy, as a matrix of rare global communities. The basis of this attention is the rare and unique flora of the Oak Openings. Since the first rare plant list was created in early 1980, Lucas County has led the state with more rare plant species than any other county in Ohio. This is primarily because of the presence of the Oak Openings Region and, to a lesser extent, the Lake Erie marshes.

In his 1928 book “The Flora of the Oak Openings,” Edwin L. Moseley introduced the botanical community to the Oak Openings. He listed 715 species that he had found in this region and told of the uniqueness of the inland sand dunes and wet meadows. Since Moseley’s book was written, approximately 1,200 vascular plant species have been found in the Oak Openings. Of these, 940 are native to the region, and 157 are listed on Ohio’s 2014–2015 Rare Species List. Unfortunately, 28 rare species are now extirpated (locally extinct) from the region. Almost half of those are from the various types of open wetlands that used to be so prevalent in this area, but are now extremely rare. This leaves 129 Oak Openings rare plant species that are currently listed as endangered, threatened or potentially threatened in Ohio: the highest collection of rare species anywhere in the state.

The pie chart below shows where Ohio’s 157 rare species could be found. Species that can grow in several communities are listed only once in the community where they are most commonly found. Extirpated species are illustrated with dotted pattern. The chart illustrates that 82% of the state-listed species in the Oak Openings Region either occur or occurred in the dry prairie/savanna areas or the wet meadow/wet prairie communities.
The wet meadows and wetlands include communities such as Twigrush Wet Prairie, grass-sedge meadow, and the acid and alkaline wet sand prairies. Because these communities are so dependent on the level of the water table, even slight changes could cause the loss of much of the flora. Not only are 33% of the rare species found in Ohio’s communities, but 9% of the wet prairie species are no longer found in the Oak Openings Region. Some of the rarest species found in these wet to seasonally wet unshaded communities include grass-leaved arrowhead, little yellow sedge, Long’s sedge, Canadian St. John’s-wort, lance-leaved violet, Virginia meadow beauty, several gentians, orchids, nut-rushes and forage grasses. Many of the most beautiful species like the fringed gentians, grass-pink and orange fringed orchids are found in these communities. Species that have been lost from this community are the showy and white lady’s-slipper orchids and the eastern prairie fringed orchid.

The dry prairies and savannas include communities such as Midwest Sand Barrens, Black Oak/Lupine Barrens, Mesic Sand Tallgrass Prairie, and sand prairie. Typical rare species of these communities are the blue lupine, plains pussytoes, western sunflower, sweet-fenn, dotted horsemint and blunt-leaved milkweed. When compared to the 2008 rare plant list, five of the six rare species added to the 2014 list typically were found in these communities. The newly listed species include forked triple-awned grass (first collected in 2008), bushy horsemint (first collected in 2010), treewarrenia (five to the state in 2004), beardedmust and showy goldenrod. The latter two species have always been known to the region, but have recently declined.

A very specific community that was included in the wet prairie category, but sometimes is included within the dry prairie is the palustrine sand plain. This micro-community is a seasonally saturated, mineral sand, water-table-driven community. It can be described as an area too wet for most perennial upland species and too dry for most perennial wetland species. These areas are often partially human-induced (drying pond edges, borrowing areas and tire ruts) where the dry sand has been excavated to the level of ground water interaction. Species of this specialized habitat are typically found in dry, open woods and clearings in well-drained soil; where you find it, you find oak savanna, often as Black Oak/Lupine Barrens. Lupine is also a keystone species for several endangered species of butterflies; they cannot survive without this plant. These butterflies include the federally endangered Kame blue butterfly and the Pansy dusky wing and frosted elfin butterflies, which are endangered in Ohio and threatened in Michigan.

The prickly pear has large fleshy stems that conserve water. Other species such as blue lupine, prickly dock, little bluestem grass and prickly pear cactus. Root systems of prairie plants can reach up to ten feet deep. The prickly pear has large fleshy stems that conserve water. Other species such as black-eyed Susan and western sunflower have coarse hairs that insulate the plant from the sun, helping to prevent excess drying. Whatever the case, native plants have developed a strategy for survival in this area that is unmatched by horticultural hybrid species.

The most evident trend from the above comparisons is the importance of the dry prairie and wet prairie communities for the preservation of the high diversity of plants that we enjoy in the Oak Openings. Today, members of the Green Ribbon Initiative, as well as private individuals, are restoring their lands to a more natural state. Part of this restoration effort includes the reintroduction of native plants that helps to re-create the diversity of these areas.

Oak Openings native plants have been adapting to the conditions of northwestern Ohio and southeast Michigan for close to 10,000 years. These adaptations are most notable with the highly drought-tolerant species such as blue lupine, prickly dock, little bluestem grass and prickly pear cactus. Root systems of prairie plants can reach up to ten feet deep.
The Oak Openings is a prime destination for bird watchers, especially during the spring and summer.

The unusually diverse array of plant communities attracts a wide variety of bird species to the Oak Openings, and a remarkable feature of the area’s bird life is the occurrence in summer of species many miles from their normal geographic limits.

Here are some examples:

- **Lark sparrow**: Although pairs show up occasionally elsewhere in Ohio, there are no other established populations of this western prairie bird in Ohio or Michigan.
- **Golden-crowned kinglet**: Their normal breeding range extends northward from central lower Michigan, but several times during the past 20 years, they have nested in conifer plantings near Oak Openings Preserve Metropark.
- **Summer tanager**: Several pairs nest each year in the Oak Openings, their normal summer range extends from southern Ohio southward.
- **Blue grosbeak**: Another southern species, these are now a regular summer resident in Oak Openings Preserve Metropark and have also been recorded at Kitty Todd Nature Preserve and Whitford Township Park.
- **Red-breasted nuthatches, pine warblers, and blue-headed vireos**: A few pairs nest annually in conifer plantings in the Openings. It is at least 100 miles to the next established breeding populations of these species.

A glance at a satellite photograph of the Oak Openings reveals why this unique and diverse subset of birds nests here: even from space, the Oak Openings is clearly distinguishable as a green corridor surrounded by an extensive urban/agricultural landscape with far less tree cover. A partial list of additional birds dependent on the habitats in the Openings includes barred owl, broad-winged hawk, Acadian flycatcher, white-eyed vireo, veery, wood thrush, ovenbird, blue-winged warbler, hooded warbler, brown thrasher, yellow-breasted chat, rose-breasted grosbeak and eastern towhee. For all these species, the Oak Openings is their stronghold, and their continued survival as breeders in our region may well depend on the plant cover the Openings provides.

**Primary Habitats**

**Black Oak/Lupine Barren**: Birds of oak savannas appear to be on the increase since conservation organizations have focused their efforts on restoring this habitat. Signature birds of this open woodland habitat include red-headed woodpecker, eastern bluebird and summer tanager. The red-headed woodpecker and eastern bluebird nest in cavities of the sparsely scattered trees of this habitat. Eastern wood-pewees, great crested flycatchers, and yellow-throated vireos also thrive in this habitat.

**Shrublands**: Birds of shrublands are most common in the Oak/Lupine Barrens. Signature birds of this habitat include eastern bluebird, Acadian flycatcher, and eastern towhee.
Oak/Blueberry Forest: Deciduous forests provide essential habitat for many of our threatened and declining tropical migrant songbirds. Typical birds include wild turkey; red-shouldered and broad-winged hawks; barred owl; black-billed and yellow-billed cuckoos; pelican; hairy; and red-bellied woodpeckers, great crested flycatchers; red-eyed vireos; vireo; wood thrush; ovenbird; hooded warblers and scarlet tanagers. However, in more open stands of this habitat type there are relatively lower bird diversity.

Midwest Sand Barren: This open habitat, maintained by controlled burns, selective herbicide application and cutting of invading woody vegetation, is essential to the continued presence of the lark sparrow. Where sufficient low shrub cover exists, sand barrens are also inhabited by field sparrows, eastern towhees, and (rarely) prairie warblers.

Mesic Salt Tolgrass Prairie: Historically, tallgrass prairie extended for miles through the Oak Openings, but now heavy fragmentation renders remaining patches too small for many grassland bird species. Although the Henslow’s sparrow, dickcissel and bobolink were once widespread, they are now only found in a few of the remaining patches. In general, tall dense stands of grass contain relatively low abundance and diversity of birds in summer; they present difficulties for nest placement and mobility. Tallgrass habitat for birds may be enhanced by creating a few openings to increase structural diversity and adding limited shrub cover to act as perches for territory displays and predator surveillance.

Twigrush Wet Prairie: In earlier times, the area between Innen and Schwabengerge Roads in Swanton, OH, was especially wet, and bird surveys by John Stophlet in the early 1950’s suggest that many wetland species nested there at least into the middle of the 20th century. Birds formerly present in the wet prairies included northern harrier, least and American bitterns, sora, king and Virginia rails, common gallinule, American woodcock, Wilson’s snipe, willow flycatcher, sedge warbler, common yellowthroat and swamp sparrow. Although sora and Virginia rails and snipes may nest in exceptionally wet years, only the woodcock, flycatcher, yellowthroat, swamp sparrow, and red-winged blackbirds remain as regular summer residents.

Great Lakes Pin Oak/Swamp White Oak Flatwoods: Where sufficient undercutting exists, this moist forest type can support many of the neotropical migrant species listed above under Oak/Blueberry forest.

Although the habitats below are not the dominant Oak Openings communities, they are very important for the continued welfare of many bird species that depend on them.

Shortgrass meadows and fallow fields: Populations of grassland birds are especially fragile in the Oak Openings, since very few large expanses of grassy meadows exist. Most of the fields extensive enough to provide habitat for grassland birds are in or around airport properties. Typical birds are savannah and grasshopper sparrows, red-winged blackbird; eastern meadowlark, and (occasionally) Henslow’s sparrow and dickcissel. Three other species, sage wren, upland sandpiper and bobolink, no longer nest in the Oak Openings. Some summer records of the sage wren at Kitty Todd Nature Preserve in the 1980’s provide hope that this species might return if more habitat were provided.

Shrublands: This habitat invades when farmland is abandoned, or when prairies and meadows are not maintained by fire and other disturbances. Shrublands of ten feet little size since they tend to be invaded by aggressive non-native species such as buckthorn, multiflora rose and autumn olive. But with management, native plants such as gray dogwood, American hazel, New Jersey tea and young oak trees can also provide shrubland habitat. Shrublands are crucial for the continued survival of some declining species, including white-eyed vireo, eastern towhee, brown thrasher, blue-winged and chestnut-sided warblers and yellow-breasted chat.

Conifer plantings: Conifers are not native to this area, but are essential for the continued presence of blue-winged vireo, red-breasted nuthatch, and pine warbler. The occasional local nestings of pine siskins and golden-crowned kinglets are also entirely conifer-dependent. The sharp-shinned hawk, a rare summer resident, often chooses a dense, isolated conifer stand for nesting. Dense conifer are also used for daytime roosting by owls.

Floodplain forests: Extensive floodplains exist along Swan Creek, Ottawa and Huron Rivers, and River Daison. Four watersheds draining the Oak Openings. Dominated by silver maples, eastern cottonwoods, sycamores and (formerly) American elms and ash trees, these tall-canopied forests are among the most bird diverse vegetation types in the region. Raptors, cuckoos, woodpeckers and a wide variety of songbirds make their homes there. In Ohio’s Oak Openings, the regionally very yellow-throated warbler nests exclusively in tall sycamores along these watercourses.

Shrublands: Shrublands are one of the habitats in shortest supply, making birds of these communities most critically endangered locally.

Residents of the area should watch the sky from mid-September through early November, because the Oak Openings is a major flyway for birds of prey migrating southward. Mid-September is the peak migration time for broad-winged hawks; on fair weather days hundreds or even thousands may pass overhead. Other raptors that pass over the Oak Openings each fall include turkey vultures; sharp-shinned, Cooper’s, red-shouldered and red-tailed hawks; northern harriers, osprey, bald and golden eagles and three species of falcons.

Because this article has focused on “special” birds of the Oak Openings, little mention has been made of some of the commonest species in the area. Widespread species such as red-bellied woodpecker, eastern kingbird, red-eyed vireo; bobolink, ruffed grouse, tufted titmouse, white-breasted nuthatch, gray catbird, field, chipping and song sparrows; house and Carolina wren; indigo bunting; Baltimore oriole and American goldfinch are especially abundant in the Oak Openings and can be located there with relative ease.
The mammals of the Oak Openings Region comprise some of the most obvious and sought-out animals such as white-tailed deer, to the most common, yet seldom-seen creatures, like white-footed mice.

Mammals are a class of animals that have backbones (they are vertebrates), are live born (placental), have hair and as youngsters receive their nourishment from milk that is provided by their mother. They exploit a variety of den sites, from burrows underground and the hollows of decaying trees, to engineering their dwellings from leaves and sticks. This fascinating group of animals fills many niches, such as scavengers, predators and seed dispersers.

American badgers are one of the most exciting members of the weasel family. They are a grassland predator that needs loosely-packed soil in which to easily dig. As carnivores they will eat rodents, snakes, turtles, amphibians and sometimes even insects. Equipped with a dirt-shedding pelt, an extra protective eyelid and very long claws on their forelimbs for digging, badgers are dialed in for an underground lifestyle. This suits them well, as their most important prey in the Oak Openings Region are woodchucks. Not only do they eat them, but they also frequently take over their dens afterwards. But badgers have no trouble excavating their own burrows, which can be up to 30 feet long. They are famous for being able to dig so quickly that it almost seems as if they disappear underground!

Woodchucks, often called groundhogs, are the largest members of the squirrel family in our region and usually live where woodland meets grassland. They excavate underground dens that can reach 30 feet in length and are true vegetarians, consuming green plant material and seeds. Being true hibernators, they spend several months in their dens each winter. And as noted above, they are often the main course for American badgers!

Moles are dwellers of the underworld. Throughout all the sandy-soiled Oak Openings’ habitats, they make their presence known by the lines of raised soil they leave wherever they tunnel. This churning of the soil is important to the ecosystem, as it brings forth seeds that were too deeply buried to germinate and loosens the ground’s surface so that new seeds are more easily received. The most common and largest of the moles is the eastern mole. Moles are extremely muscular, hyper-metabolic creatures and have eyelids that have grown shut over their eyeballs to keep out dirt. Moles feel and smell their way through the soil and leave behind a lattice of tunnels that are important "subway systems" for many other creatures such as blue racer snakes, mice and shrews.
It is hard to believe that white-tailed deer were eliminated from Ohio by the late 1800s. Today, thanks to a very successful conservation program, this large and beautiful mammal is probably more numerous than ever and is one of the most sought-after animals by wildlife watchers. Deer also have become somewhat controversial because of their desire for plants in people’s gardens and yards! Their historic predators, cougars and gray wolves, were eliminated from the Oak Openings in the mid-1800s, leaving humans as their only predator.

Gray wolves were eliminated from the region in the 1800s, leaving the niche of a large predator unfilled until coyote backfilled from the western states. Coyotes were not in Ohio or Michigan at the time of European settlement and now reside in every county in these states. These medium-sized members of the dog family are efficient predators, although not capable of taking large prey, such as healthy adult deer, because they are not pack hunters as are wolves. Red fox are successful denizens of oak forest ecosystems and grasslands and make their living by preying small animals, scavenging and even eating forest and prairie fruits. Both coyote and red fox are nomadic, using thousands of square miles, and the combination of digging under a fallen tree (fox) or as hibernaculums.

Raccoons are probably more numerous now in North American than they have ever been. They maraud the trees, forest floor and grasslands in search of anything edible. White cute in appearance, raccoons are voracious predators of songbirds and turtle eggs in the Oak Openings, and may take a huge toll on their numbers. With the reduction or elimination of most of the large predators such as cougars and wolves, there has not been much to keep the raccoon population in check. They should be avoided if approachable, as they can carry not only rabies and distemper, but also roundworm.

One could find at least a dozen species of bats in our region. In natural Oak Openings landscapes, bats will usually roost in hollow trees or loose bark. All of our region’s bats are nocturnal and insectivorous; during their night feeding forays they can be observed over waterways, grasslands or woodlands—wherever the insects are at that time. With a wingspan of up to 23 inches, the big brown bat is our most common bat and each one can consume thousands of bugs per evening. Bats are the only mammals that truly fly. A bat’s wings is really a highly evolved forelimb with very elongate inter-webbed digits or fingers. Bats navigate and find their prey using echolocation (sonar) even though they have decent vision. Bats conserve energy during the insect-free winter months by hibernating. Recently, a fungal disease called white nose syndrome has pummeled bat populations and could even lead to some species extinctions.

MAMMAL ACTIVITY IN THE OAK OPENINGS

In the late 1800s and early 1900s, northwest Ohio was clear-cut to make way for the expansive agriculture industry, and many native species of plants and animals became locally extinct, or extirpated. Since then, conservation agencies and private landowners have been working together to restore native ecosystems and habitats. As a result, several extirpated species may be moving back into their former habitat in the Toledo area, as they are throughout the U.S.

The Wild Toledo program at the Toledo Zoo is monitoring the movement of wildlife within a corridor from Secor Metropark to Maumee State Forest by deploying trail cameras in remote areas in the parks. The project will help determine the presence or absence of many animals, including bobcats, badgers, turkey, black bear, coyote, deer and meadowlarks, as well as others.

You can find out more about Wild Toledo and view camera images at www.wildtoledo.org/wildlife-tech/
CH 5: MAMMALS  OAK OPENINGS

EASTERN CHIPMUNK  FOX SQUIRREL  FLYING SQUIRREL

OAK/BLUEBERRY FOREST

AMERICAN BADGER  LEAST WEASEL  EASTERN MOLE

BLACK OAK/LUPINE BARREN

WOODCHUCK  RED FOX

MIDWEST SAND BARREN

COYOTE  RACCOON

MESIC SAND TALLGRASS PRAIRIE

BIG BROWN BAT  VIRGINIA OPOSSUM

TWIGRUSH WET PRAIRIE

BEAVER

GREAT LAKES PIN OAK/SWAMP WHITE OAK FLATWOODS

WHITE-TAILED DEER  COYOTE  AMERICAN BISON

THE NATURE CONSERVANCY

MESIC SAND TALLGRASS PRAIRIE  TALLGRASS PRAIRIE  TWIGRUSH WET PRAIRIE

GREAT LAKES PIN OAK/SWAMP WHITE OAK FLATWOODS  TOLEDO METROPARKS

WHITE-TAILED DEER  COYOTE  AMERICAN BISON

THE NATURE CONSERVANCY
Amphibians and reptiles play very important roles in the ecosystem and are integral parts of every natural community in the Oak Openings Region, from the dry sand dunes to the wet prairies.

Although amphibiaans and reptiles are quite different in their characteristics, the study of these two classes of organisms is combined into the discipline of herpetology—Greek for “the study of things that creep and crawl.”

Amphibians

Amphibians in the Oak Openings are composed of two orders: Caudata (salamanders and newts) and Anura (frogs and toads). Amphibians are characterized by the porous, thin and usually moist skin that is important for gas exchange, much like a lung worn inside-out on the surface of their bodies. In fact, one family of salamanders (Plethodontidae) does not even have lungs, but relies entirely on its skin for respiration! Historically, 19 species of amphibians have been documented in the Oak Openings, although three have not been recorded in many years and may be extirpated, or locally extinct, from the region. Most amphibians have a life cycle that includes both an aquatic and terrestrial life stage. This cycle begins with eggs deposited into a wetland in late winter or early spring. The eggs are surrounded by a gelatinous material that allows the developing embryo to exchange fluids and gases with the surrounding water. Upon hatching, larvae emerge. Frog larvae feed on algae, aquatic plants and detritus in the wetland, while salamander larvae eat small aquatic invertebrates and other amphibians. Larvae may stay in this aquatic stage for as little as 4-6 weeks (American toad and Fowler’s toad) or as long as 2 years (American bullfrog) before metamorphosing into an adult. For most of the region’s amphibians, metamorphosis occurs in the summer months, just before their temporary wetlands dry up for the season. One amphibian found in the Oak Openings Region does not rely on wetlands for laying its eggs. The red-backed salamander chooses a moist spot under a log or underground to lay and brood its eggs. Larvae of this species complete their metamorphosis inside of the egg and hatch as minatures of the adults.

The Reptiles

The Oak Openings is home to species from two reptilian orders: Testudinata (turtles and tortoises) and Squamata (lizards and snakes). Reptiles are best identified by the thickened scales of keratin found on snakes and lizards, or the bony plates characteristic of most turtle shells. Unlike amphibians, reptile skin is more impenetrable to water loss, allowing them to exploit drier habitats. Historically, 22 species of reptiles have been recorded in the Oak Openings Region, although four species have not been recorded from the region in many years and may be extirpated. The reptilian egg and early lifecycle is also less dependent on moisture compared to an amphibian. The reptilian egg is covered with a keathery or hard shell, reducing water loss. Reptiles hatch from these eggs as smaller versions of the parent.
STUDENTS EXAMINING BREEDING SPOTTED TURTLES

PRAIRIES AND SAVANNAS

The frogs and toads of the Oak Openings are perhaps the most commonly encountered and familiar of all the amphibians. In March and April, visitors to Twigrush Wet Prairies are likely to hear hundreds of calling western chorus frogs and spring peepers, as well as the snore-like call of the northern leopard frog. Male American toads begin calling in April, and Fowler’s toads take over in late May and June. Given their affinity to sandy soils, Fowler’s toads have found excellent habitat in the Oak Openings. Although the spotted turtle is sometimes found in ditches and pond margins, it is essentially a species adapted to Twigrush Wet Prairie. Unlike many other turtles, spotted turtles may live their entire lives in water no more than a couple of inches deep. In fact, some populations in the Oak Openings only have access to water for part of the year, and bury their eggs more than a couple of inches deep. In fact, some populations in the Oak Openings only have access to water for part of the year, and bury their eggs more than a couple of inches deep. In fact, some populations in the Oak Openings only have access to water for part of the year, and bury their eggs.

When spring peepers begin calling in the prairies, wood frogs begin their quacking call from just-shrived forested wetlands. As temperatures warm, the gray treefrog starts calling. Only during their breeding season are gray treefrogs likely to be found on the ground, and then only under the cover of darkness for a couple of weeks.

The family Ambystomatidae (mole salamanders) is the best known group of salamanders in the Oak Openings, and includes the blue-spotted and eastern tiger salamanders. These are the first to become active in the late winter as they move overland to vernal (temporary) pools to breed. Males enter the water and search for a female. When a female is encountered, an elaborate courtship dance ensues that includes the male rubbing the female’s chin and tail. The most commonly encountered mole salamanders in the Oak Openings cannot be easily assigned to a species. These all-female populations have genes from two or more species (always including the blue-spotted salamander), and usually have more than the usual two sets of chromosomes. In older field guides you may find references to the tiny Trembley’s salamander, names given to two of the more than 20 different combinations that have been identified so far. Don’t be discouraged by your inability to name each salamander you find; instead, marvel at the wonder of these “unisexual salamanders” and their unique life history that we are only beginning to understand.

Permanent Bodies of Water

Several species are dependent on permanent sources of water, including Oak Openings’ largest frog—the American bullfrog and northern green frog. Their calls can be heard late into the summer, with their larvae remaining conspicuous most of the year. Many species of Oak Openings’ turtles are only likely to be encountered in and around creeks, rivers, ponds, canals, and larger ditches. These include the eastern snapping turtle, eastern spiny softshell, common musk turtle, northern map turtle and Midland painted turtle. The best chance of observing many of these turtles is by canoe or boat, as they often can be seen basking along the shoreline.

Oak Woodlands

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While not rare throughout the entire state, the eastern box turtle’s distribution in northwestern Ohio is generally limited to the Oak Openings Region. Here it is often seen after summer rainstorms, munching on worms, berries, or fun in woodlots, savannahs and adjacent prairies. The eastern box turtle is one of the most specialized diets of any snake and is often found in the mature Oak/Blueberry Forest. Hog-nosed snakes have evolved a special set of characteristics that allow them to feed on toads, which make up their entire diet. These include an enlarged pair of rear teeth, thought to help deflate toads that puff themselves up when in danger. These snakes also have a large adrenal gland to compensate for the toxins released by the toad’s skin. The hog-nosed snake gets its name from the upturned scale on the tip of its snout, thought to be important for digging in the sandy soil where toads often live. Should you ever encounter one in the wild, it won’t be its toad-eating abilities that will grab your attention, though. When disturbed, hog-nosed snakes go through an elaborate display that includes flattening out their neck and raising their head off the ground, much like a cobra. This is followed by hissing and lunges toward its adversary; however, it rarely bites. Should this impressive display fail to scare off the attacker, the hog-nosed snake plays dead. This begins with death rolls, the expulsion of any food or feces, and even a little blood from the mouth, and ends with the snake lying motionless on its back. Should the snake be rolled onto its belly, it will quickly turn itself back over, as if to convince the attacker it is really dead!

American toad

Other salamanders found in the Oak Openings include the “lungeless” salamanders (Family Plethodontidae), the red-backed and four-toed salamanders. Four-toed salamanders use vernal pools for breeding, but only those that are undisturbed and contain both moss growth in and around the pool. Unlike the mole salamanders, four-toed salamanders do not enter the water to breed, but instead the female salamander climbs underneath a mats of moss on a log or tree trunk, overhanging the water where she lays her eggs. She cools her body around these eggs and remains with them until shortly before hatching, when the larvae hatch and fall into the water.

A rare semi-aquatic turtle of the Oak Openings is the Blanding’s turtle. In this region, Blanding’s turtles have been observed in and around vernal pools, as well as walking about the forest floor in wooded areas. Studies have shown that this species moves through a complex of wetlands and uplands throughout the year. The Blanding’s turtle illustrates typical turtle life history traits very well. Females may take up to 18 years to reach sexual maturity, when they begin to lay clutches of 6-10 eggs every other year. Mortality of the eggs and young is naturally very high, and, in at least one population studied, 98% of the adults must survive each year to have a stable population. Many turtle species, including the Blanding’s turtle, live to be over 50 years old.

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Call to Action

Allow wetlands in your backyard to flood seasonally and provide breeding habitat for amphibians; it’s best if they stay wet until July.

Keep fish out of breeding ponds because they eat amphibian eggs and larvae.

Concerned about mosquitoes? Let salamander larvae do the work! One study showed that seasonal wetlands with salamander larvae had 98% fewer mosquito larvae than those without salamanders.

Help turtles safely cross roads by moving them in the direction they are headed.
The study of insects has a long history in the Oak Openings Region, while the study of spiders is more recently developing.

Naturalists Dr. Edward S. Thomas and his brother John made many trips from Columbus, Ohio to the Oak Openings during the 1930s researching its plants, birds and insects. John was an avid butterfly collector, and it’s to him we owe our early knowledge of the butterflies of the Oak Openings. In the mid-1900s, Homer Price, an amateur naturalist and a collector of butterflies and dragonflies, made frequent trips to the Oak Openings. He recorded many endemic species, a few of which have since disappeared from the region. In 1961, he was the last person to collect in Ohio the now federally protected dragonfly, the Hines’s emerald.

Today, seven species of butterflies found in the Oak Openings are protected by the states of Ohio or Michigan. Of those listed as endangered in Ohio, four are found only in the Oak Openings and nowhere else in the state. Three of these make their home in Black Oak/Lupine Barren and Midwest Sand Barren communities, and all three use blue lupine as their larval host. The Karner blue butterfly, whose larvae feed exclusively upon blue lupine, was once extirpated from the Oak Openings. The re-establishment and management of large stands of blue lupine for Karner blue butterflies have also benefited the frosted elfin and Persius dusky wing. The frosted elfin is currently known from two sites in Ohio, but only one is protected. It has not been recorded in southeast Michigan since 1975. The true range of the Persius dusky wing in the Oak Openings is not accurately known because this skipper is easily confused with three other species of spring flying dusky wing skippers. However, Persius is the only dusky wing to lay its eggs on blue lupine. Kitty Todd Nature Preserve is the best place to observe all three of the lupine feeders.

The Edwards’ hairstreak lives in the company of ants within Black Oak/Lupine Barrens and Midwest Sand Barrens. In much of Ohio, the larvae of this butterfly are tended by the red Allegany mound ant. However, in Michigan, larvae are associated with the black/redwood mound ant. The butterfly larvae secrete sweet nectar that the ants consume; in return, the ants guard larvae from parasitic wasps while they feed on oaks. In Ohio, this butterfly was once thought to be restricted to the Oak Openings, but it’s now known from several Ohio counties. Look for this butterfly near large ant mounds and small oaks in late June or early July.

The dusted skipper and Leonard’s skipper can both be found in Mesic Sand Tallgrass Prairie. The dusted skipper is a secretive, but beautiful, skipper that feeds on prairie grasses such as big bluestem and little bluestem. Today it’s known from six colonies in the Ohio Oak Openings, and has not been recorded in Michigan’s Oak Openings since the late 1980s. The Leonard’s skipper is the last butterfly to emerge in the Oak Openings. It flies in late August, and can be found taking nectar from the blossoms of rough blazing star. Both the dusted and Leonard’s skippers are losing ground to development in the region.
Several protected butterfly species can be found in Twigrush Wet Prairies, preferring to feed and lay eggs upon plants within this wet system. The endangered Ohio butterfly, the purplish copper, was found in the Twigrush Wet Prairies of Ohio and Michigan, but there are no known active colonies of this butterfly in the entire Oak Openings. This species has been greatly affected by the spraying of chemicals and development in the region. Look for the pupal copper around its larval host, water-smartweed.

The silver-bordered fritillary is also associated with wet prairies. This species has declined throughout the region since the 1990s, and is threatened in Ohio. This species has been hurt by mis-timed use of fire, chemical spraying, and land development. The larvae of the silver-bordered fritillary feed on a potentially threatened plant, lance-leaved violet.

**SPIDERS**

The spiders of the Oak Openings Region are poorly known, with only 100 species discovered so far. Considering how little spider sampling has been done here, a relatively large proportion of these are rare and unusual species for Ohio and Michigan.

Two burrowing wolf spiders, Geolycosa missouriensis and Hogna bathymorpha are denizens of sandy soils and are relatively common in the Black Oak/Lupine Barrens. Though these spiders belong to the same family (Lycosidae), they behave differently from each other. The G. missouriensis are rarely found away from their burrows. Juveniles disperse from their mother’s burrow and adult males seek mating partners. The rest of the year these spiders live at the bottom of their burrows during the day, and hunt near the top at night. In contrast, the H. bathymorpha leaves their burrows to hunt for prey. Typically they return in the morning and spend the daytime hiding in the burrow. They also spend long periods of inactivity, for example during winter, in the burrow.

For both species, it is not unusual to find a small “midden” of indigestible prey remains at the bottom of a long-occupied burrow.

Two northern species of jumping spiders, the ground spider Gnaphosa muscorum, and the running crab spider Philodromus imbellis, have been recorded in the Oak Openings Region. Both species are wandering spiders that do not build a web. They often hide under rocks, fallen debris, or under bark of standing dead trees and shrubs. Like the majority of crab spiders that one might find in a flower garden or in a flower bed, the running crab spiders differ from most crab spiders in that they are lightning-fast runners. These two species are unknown elsewhere in Ohio. Another rarely-collected Ohio spider that has been recorded in the Oak Openings is the small orb-weaving spider Sinope wagneri. This species is known from the margins of the Great Lakes and the Atlantic coastline. We know almost nothing about the biology of these beautiful little spiders.

**BEETLES AND OTHER INSECTS**

In addition to dragonflies and butterflies, the Oak Openings is home to a number of other interesting insects. The common six-spotted tiger beetle is metallic green with a series of white spots on its back. It is an early-season species. Look for it alighting sandy trails in Oak/Blueberry Forest. The less common dark tiger beetle is a species that loves early morning and late afternoon. It can be found walking on top of the deep white sand in Midwest Sand Barrens. By its name, you can guess that its almost white appearance makes it very hard to see on the white sand. Unlike a lot of tiger beetles, when it’s disturbed it will fly only a short distance before landing.

Midwest Sand Barrens are home to several other unique species. In 2002, the Great Plains spittlebug was discovered at Kitty Todd Nature Preserve. This was a state record for Ohio; the current state record was 120 miles northwest in Van Buren County, Michigan, where this species is listed as special concern. These spittlebugs are typically found at dry, well-drained sites. The amazing antenna-waving wasp is also found in barrens. The female stings the short-horned grasshopper to immobilize it, then lays eggs on the insect and buries it in burrows in the sand. The larvae develop in the burrows and emerge as adult wasps.

**KARNER BLUE BUTTERFLY**

Fitting among the gardens of rare flora are a number of living jewels—the rare butterflies of the Oak Openings. Some, such as the magnificent great-spangled fritillary, are still marginally common. Others, such as the fronted mother’s day, and the Karner blue butterfly, hang on precariously in only a few restricted localities. Endangered Karner blue butterfly, Lycaeides melissa samuelis, has suffered catastrophic population declines in the United States over the past two decades and has declined by 99% over its range in the past 100 years. The Karner blue has been extirpated from Illinois, Minnesota, Wisconsin, and Pennsylvania. Once extirpated from Ohio as well, it was reintroduced to the state in 1998 as the result of efforts by a powerful coalition composed of the Michigan and Ohio Department of Natural Resources, the U.S. Fish and Wildlife Service, The Toledo Zoo, The Nature Conservancy, and the Metroparks of the Toledo Area. The Karner blue is dependent upon the blue lupine, which is the host plant for the larvae. Eggs, which are laid the previous summer, remain dormant over the long winter and hatch in April. The 1-mm larvae feed slowly on lupine for about three weeks, growing to about 12 mm in length. They then pupate in a world of pupal caps, the process in which the caterpillar transforms into a butterfly within its chrysalis. The adult butterflies emerge in mid-May, mate, and lay eggs on lupine. These eggs hatch in about three days, and the larva continues again, ultimately producing a second-flight but tetter that emerges in July. These butterflies mate and lay eggs as well, but this time the eggs do not develop until the following spring, completing the two-flight, or bivoltine, cycle of the Karner blue butterfly.

Since the Karner blue butterfly’s initial reintroduction to The Nature Conservancy’s Kitt’s Todd Nature Preserve, it has also been reintroduced to areas of Oak Openings Metropolitan, Ohio DNR’s Meilke Road Savanna and Michigan DHQ’s Potter Park (Steele Game Area). Homeowners in the Oak Openings can speed the return of the Karner blue by retaining the natural communities around them and by landscaping with prairie grasses, blue lupine and other species of native prairie wildflowers rather than exotic plants and expansive lawns.
CH 4: SIGNIFICANT BIRDS

BLACK OAK/LUPINE BARREN

OAK/BLUEBERRY FOREST

MIDWEST SAND BARREN

MESIC SAND TALLGRASS PRAIRIE

TWIGRUSH WET PRAIRIE

GREAT LAKES PIN OAK/SWAMP WHITE OAK FLATWOODS

AMERICAN PAINTED LADY

HOGNA BALTIMORIANA

COMMON BUCKEYE

GREAT PLAINS SPITTLEBUG

SILVER SPOTTED SKIPPER

BEAUTIFUL TIGER BEETLE

DUNE GHOST TIGER BEETLE

HABRONATTUS ORBUS

LEONARD’S SKIPPER

EASTERN CICADA KILLER

PEARL CRESCENT

GREAT-SPANGLED FRITILLARY

BLACK SWALLOWTAIL

RED-SPOTTED PURPLE

AMERICAN COPPER

GIANT SWALLOWTAIL

TIGER SWALLOWTAIL

EDWARD’S HAIRSTREAK

DUNE GHOST TIGER BEETLE

EASTERN CICADA KILLER

LEONARD’S SKIPPER

Baltimore Checkerspot

QUESTION MARK BUTTERFLY
Although the Oak Openings seem to thrive on disturbances like fire or high water, they are actually fragile in structure. Water, including the nutrients it carries, is funneled directly into a stream. By Michelle Grigore, Ph.D.

Like a spider’s web that needs to be re-spun each night, Oak Openings habitats need constant diligence from stewards who care for this land.

In this chapter, we’ll examine what threats exist and the conservation needs of the rare plants and animals of the Oak Openings Region.

Habitat Loss and Fragmentation

Like all natural areas, the Oak Openings is shrinking as our population grows. Near Toledo and Detroit, urban sprawl is the biggest threat to the survival of Oak Openings species. It leads to incompatible land use like mining sand, passing over natural areas and ditching or filling the low-lying wet prairies. What is lost is often irreplaceable, yet what is built may only last decades before it is abandoned. Land use planning and zoning for natural areas, wetlands and floodplains are valuable tools that can be used to reduce loss of Oak Openings habitat. Even managers of nature preserves must find a balance between preserving the natural area and allowing people to access their splendor, because with people, horses and off-road vehicles often come invasive plants, erosion of sensitive lands and activity that disrupts wild animal behavior.

Fragmentation, the isolation of natural areas surrounded by development, is also a serious threat to Oak Openings species. Existing preserves will become, in effect, relics adrift in a sea of residential and commercial development unless something is done now to plan for the future. When animals and plants become isolated, disease or inbreeding can wipe out fragmented populations. Connecting corridors of public and private land are the best hope for keeping these important sources of Oak Openings biological wealth connected to each other.

Natural Processes Gone Awry

Woody Plant Succession

In the Oak Openings, woody plants encroach and take over the sunlit prairies and savannas. Thousands of years ago, Ohio was much drier than now, so prairies easily maintained their hold without intervention. The current climate is much wetter and cooler, making it easy for the Oak/Blueberry Forest to overcome the sunny Mesic Sand Tallgrass Prairie and Black Oak/Lupine Barren communities.

To set the clock of succession back to “Prairie” or “Savanna,” land managers use selective mowing, cutting, chemical treatments and fire. All of these tools remove woody plants, but fire especially favors the deep-rooted prairie plants. Raising water tables can also reduce woody plant succession and nourish the wet prairies, but this is much more difficult because of the probability of flooding adjacent property owners.
Lowering Groundwater

The Irwin Wet Prairie of Lucas County, OH was once over ten miles long; oral history passed on the stories of Indians canoeing across this prairie expanse in search of waterfowl, even in summer. The Sibley Prairie of Wayne County, MI extended nearly eight miles, from the 1753 US-24 split on the northeast nearly to Oakwoods Metropark on the southwest. Of the 16 Oak Openings plant communities, the Teignshaw Wet Prairie community is now the rarest due to ditching, pumping, private wells and ponds and paved surfaces that quickly shift away rain into storm sewers and ditches. The result is lower levels of water in the ground because rain doesn’t get a chance to soak into the soil and replenish it. At one time, water sat above the ground most of the year in the Irwin and Sibley Wet Prairies. Now you have to dig four to five feet down most of the year to find the groundwater. This dramatic change has led to increased woody plant growth and the demise of nearly all the pre-settlement Teignshaw Wet Prairies.

NON-NATIVE SPECIES

As habitat loss, fragmentation, woody encroachment and lowering groundwater tables weren’t enough to contend with, the stewards of the Oak Openings spend much of their time and efforts fighting invasive plants. Species like glossy buckthorn, purple loosestrife and reed canary grass invade the wet prairies and crowd out native plants and wildlife. Oak savannas and prairies feel the push of privet, honeysuckles, and the unbelievably aggressive spotted knapweed. Floodplains and uplands of all the Oak Openings plant communities are covered in invasive pasture grasses like brome grass. Non-native plants often have a competitive advantage in a new country because the diseases and insects that kept them in check are absent. Many were plants. Species like glossy buckthorn, purple loosestrife and reed canary grass invade the wet prairies and crowd out native plants and wildlife. Oak savannas and prairies feel the push of privet, honeysuckles, and the unbelievably aggressive spotted knapweed. Floodplains and uplands of all the Oak Openings plant communities are covered in invasive pasture grasses like brome grass. Non-native plants often have a competitive advantage in a new country because the diseases and insects that kept them in check are absent. Many were

ANIMAL COMMUNITIES OUT OF BALANCE

Even our native animal populations can become unbalanced and wreak havoc in the Oak Openings. A healthy natural system usually includes large and medium (or meso) predators that keep the prey animals in check. Prey animals like deer, rabbits and rodents reproduce quickly and feed mainly on plant material. If their populations aren’t controlled, they outgrow their food source, which leads to starvation, overcrowding and disease. Large predators like wolves are gone, so deer populations skyrocket and you can see browse lines, where vegetation is absent as high off the ground as deer can reach, in woodlands and savannas. Deer favor colorful flowers, like blue lapisine and the rare wood lily, making it difficult for many rare plants to reproduce. Populations of mesopredators like raccoon, opossum, domestic cats and skunks have increased as large predators, who once fed upon them, are eliminated. This leads to increased predation on birds, amphibians, turtles and other animals—pushing them to the brink of extirpation in many areas.

GLOBAL CLIMATE CHANGE

The 2014 report by the Intergovernmental Panel on Climate Change predicts a 1.8-5.4°F average increase in the global surface temperature over the period 1990 to 2090. That may sound like a small amount, but the Earth was only 5 to 9 degrees cooler than today when it was covered most of the northwest United States and Canada. Today the Earth is undergoing the quickest rise in temperature ever seen. What does that mean? Boots of increasingly hot weather and more violent storms are already occurring in the Midwest, leading alternatively to droughts and flooding. Climate predictions show more severe swings in the future for our area of the U.S. Although the Oak Openings evolved over time with disturbances and prairies do well under hot, dry conditions, the prediction is that wetlands will dry up more quickly. This will lead to a loss of wetland plant species and a real threat to animals that rely on wetlands, like migrating waterfowl. We could also see a loss of showy flowers in the prairies due to climate change. Grasses appear to outpace forbs (showy flowering plants) in growth under warming conditions with high levels of carbon dioxide and nutrients, such as those experienced through current climate changes.

As temperatures warm, man-made pollution also leads to more nitrogen and phosphorus release. Although a majority of the air in our atmosphere is nitrogen (N2), that type of nitrogen isn’t usable by living things. But if nitrogen is “fixed” through a chemical reaction that attaches nitrogen to oxygen, then it can be used by plants. This activation, called “fixation,” is done in small quantities by bacteria in the soil, but typically, man-made activities increase the process. Even non-native earthworms cause changes in soil conditions we are animals and insects have also been introduced, such as the emerald ash borer—a destructive beetle that has devastated woodlands across the Midwest—or gypsy moth, which defoliates and weakens oak trees. Even non-native earthworms cause changes in soil conditions we are animals and insects have also been introduced, such as the emerald ash borer—a destructive beetle that has devastated woodlands across the Midwest—or gypsy moth, which defoliates and weakens oak trees.

CALL TO ACTION

Keep cats indoors to prevent them from killing birds. Free-ranging cats are estimated to kill at least 1.3 billion birds annually. Even well-fed cats hunt and keep from attracting potential mesopredators.

KEEP PETS ON A LEASH IN NATURAL AREAS.

Keep cats indoors to prevent them from killing birds. Free-ranging cats are estimated to kill at least 1.3 billion birds annually. Even well-fed cats hunt and keep from attracting potential mesopredators.

KEEP PETS ON A LEASH IN NATURAL AREAS.

PURPLE LOOSESTRIFE IS OFTEN PLANTED IN YARDS AND PONDS, BUT QUICKLY OVERTAKES WETLANDS AT THE EXPENSE OF NATIVE PLANTS.

YOUR LAKE ERIE WATERSHED

The Oak Openings is part of the Western Lake Erie watershed where, historically, rivers like the Huron and Maumee spilled into wide, shifting, coastal wetlands. Water meandered through thick vegetation that took up nutrients, and sediments settled out in the slow currents. Now, however, only 5% of historic Lake Erie marshes remain. Wetlands have been ditched and drained, and major rivers are channelized and dredged. Run-off, including the nutrients and pollutants in canals, is forced directly into waterways. Nutrients, in the form of fertilizer, are imported into the watershed and dispersed across the landscape. Green these changes, one may not be surprised when harmful algal blooms annually close down beaches, or water is deemed unsafe for drinking.

How does one person make a difference in a watershed nearly 30,000 square miles in size? You have already reduced the fertilizer you apply to your lawn, left unused buffer strips near the creek on your back yard, and installed a rain barrel to collect water from your roof for watering your organic garden. But there’s more! One of the simplest ways to make a real difference in your watershed is to support legislation that improves the watershed’s health. Locally, this may entail supporting local park district millages or funding to install green infrastructure on public properties. Voice your support for state legislation that protects your waters; your opinion does matter to your representatives. For example, strong public support for a bill to improve watershed conditions in Ohio’s Western Lake Erie played an enormous role in the bill’s passage after the 2014 Toledo water crisis. At the federal level, remind your representatives that the Great Lakes Restoration Initiative and Farm Bill—which have collectively restored and protected thousands of acres in the Oak Openings alone—are important to you and future generations.
COMBINING FORCES TO PROTECT THE OAK OPENINGS:
THE GREEN RIBBON INITIATIVE

BY STEVEN WOODS

At the heart of conservation in the Oak Openings is the collaboration embodied by The Green Ribbon Initiative.

The Green Ribbon Initiative (GRI) is a partnership of governmental agencies, non-governmental organizations, businesses, and individuals that accept the Initiative’s conservation mission and agree to help achieve the stated goals. Its mission is to preserve, enhance and restore critical natural areas of the globally unique Oak Openings Region and to inform residents about why this region is so important.

Through a comprehensive, collaborative planning effort, GRI has identified strategies and goals that collectively make up the Oak Openings Region Conservation Plan. This plan lays out strategies necessary to achieve measurable conservation goals. To support this plan, the Green Ribbon Initiative also completed a spatially-explicit ecological model to identify priority lands for conservation and restoration, enabling us to target activities where they will have both the highest likelihood of success and the greatest benefit to priority species (Chapter 10).

This partnership prides itself on taking action to implement the Conservation Plan. A growing number of partners contribute to the Green Ribbon Initiative and its projects, and you can too (Chapter 11)!

To date, projects funded on behalf of Green Ribbon Initiative have protected and restored several thousand acres throughout the region. These projects have produced tangible benefits for virtually every conservation entity in the Oak Openings Region, as well as improved quality of life for area residents. However, to achieve our goals, we need to ensure that this partnership persists and thrives by engaging a greater number and broader range of landowners, businesses, citizen’s groups and local governments to help us find solutions to some of our society’s biggest challenges.

The Oak Openings landscapes are rare at least in part because the common social benefits they provide were not properly valued. To preserve what’s left of our natural heritage, we need to both illustrate the benefits that nature provides and discuss the consequences of failing to value nature. We attempt to create connections in the minds of residents between the way we collectively treat our lands and waters and the effects they observe in their yards or communities. We must provide opportunities for quality nature-based experiences and immerse people in moments in nature that leave them forever changed. This is a complex task, further complicated by the large geographic area we cover, making it impossible for any single entity to achieve success alone. As a result, the many organizations dedicated to the Oak Openings each fill an important niche in protecting, restoring, and educating the public about the globally rare communities in our backyards.

Led by a Steering Committee composed of representatives from eleven organizations, GRI members participate in working subcommittees focused on protection, science, stewardship, and education and outreach. Committees discuss and take action on important issues, seeking synergies where each partner can bring resources to bear and the resulting whole is greater than the sum of its parts. Participation in the GRI has proven to be a valuable tool for conservation, assisting partners with grant applications, building support for priority projects, sharing resources and ensuring everyone has access to the best tools, information and management practices.

“It is amazing what you can accomplish if you do not care who gets the credit.”
—HARRY S. TRUMAN
**BLUE WEEK**

**EXPLORABLE. LEARN AND PLAY**

Each spring, the Oak Openings gets the blues. Kamei Blue butterflies caterpillars emerge to feed upon blue hope blanketing the oak savannas. Blue-spotted salamanders make their way to seasonal wetlands scattered with northern blue flag and Atlantic blue-eyed grass. Blue muskrat emerge from winter’s rest to warm themselves among little bluestem grasses and eastern bluebirds’ sweet songs can be heard as they make their way back to the Oak Openings from their wintering grounds.

To celebrate this occasion, Green Ribbon Initiative partners host Blue Week festival each May. Blue Week is a time for residents, volunteers, land managers and other outdoor enthusiasts to show their appreciation for this beautiful landscape and learn more about this gem in their own backyards. The festival includes native hikes, canoe trips, children’s games, native plant sales, bike rides and more. Events occur throughout the entire region and cover a variety of topics from geology to birding to butterfly so you can always find something near you of interest.

Visit [www.oakopenings.org](http://www.oakopenings.org) to learn more and find events near you.

**2050 VISION**

We envision a cooperatively managed landscape containing multiple viable examples of each natural community comprising the Lakeplain Oak Openings Ecosystem, spread sufficiently across their historic range to capture the full range of variability within these systems and to buffer against the uncertainty associated with climate change.

**2020 GOAL**

Facilitate partnership around the protection or restoration of a sufficient number of representative examples of Oak Openings habitats to create resilience in the face of large-scale stochastic events while demonstrating replicable conservation approaches.

**PROTECTION**

Setting aside important lands in the Oak Openings Region is one of the most powerful tools at our disposal; however, it is also one of the most expensive. The Green Ribbon Initiative Protection Subcommittee works to make the most of each conservation opportunity and to ensure that a property’s values are protected and maintained in perpetuity. In addition to the GRI member organizations, many other partners have protected lands throughout the region. Coordinated identification, prioritization and planning efforts have led to an ambitious goal of protecting an additional 46,000 acres, or 8.3%, of the Oak Openings Region over the next 100 years.

Property can be protected either through acquisition by one of the region’s conservation organizations or through deed restrictions called “conservation easements” that landowners place on their property. Two types of organizations typically buy and hold land for conservation: government agencies such as Ohio Department of Natural Resources or the Toledo Dandel Park System (TOPS), and charitable non-profit organizations known as “land trusts” such as The Nature Conservancy or Southeast Michigan Land Conservancy. Ideally, the highest quality natural areas are purchased and owned by an organization dedicated to conserving, restoring and maintaining these habitats while lands of moderate value are often acquired for recreational uses.

In these cases where habitat has been impacted by development or where creating a nature preserve is not practical, conservation easements may be the only way to ensure long-term, legal protection of a site. Conservation easements allow the landowner to continue to own, live on and use the property while placing legal restrictions on future subdivision and development of the parcel. Easements are either voluntarily donated to a land trust by the landowner, or in rare cases a land trust may choose to purchase the development rights. Several land trusts including the Black Swamp Conservancy and Southeast Michigan Land Conservancy accept easements; however, they usually require that a modest fee accompany the easement due to the legal obligations associated with regularly monitoring the site and ensuring compliance with the agreed terms.

**SCIENCE**

By partnering through the Green Ribbon Initiative, land conservation organizations and local research universities such as University of Toledo and Bowling Green State University are working together to achieve their respective goals. The conserved lands of the region provide an opportunity for local researchers to study these plants, animals and ecosystem processes. Their research answers important questions about how humans depend on nature, the distribution, population status and habitat requirements of individual species, and how the region is changing over time. University of Toledo, for example, is developing science-based recommendations that will help land managers prioritize invasive species prevention and removal. Other recent discoveries include new populations of Blanchard’s cricket frog and purple milkweed on privately held lands, and habitat requirements of the orange fringed orchid. In another collaborative project, Toledo Zoo’s Wild Toledo program is tracking the movements of reptiles and amphibians and is leading a team that will prioritize opportunities to return species to restored habitat within their historic range.

This research provides land managers with new information and insights that help them better understand the species and systems under their care, which in turn allows them to use resources efficiently. Students benefit by gaining practical hands-on experience while their studies produce tangible benefits in their local environment. Each partner can focus on its area of expertise while benefitting from the expertise of others, resulting in a truly symbiotic relationship.

**CALL TO ACTION**

Support the Oak Openings Habitat Protection and Restoration Fund, the Carbon Offset Fund, or General Fund with a financial contribution. Your support enhances and protects land throughout the region, and helps bring educational materials such as this very book to residents.

Tell your township trustees, mayor, or other local officials that conservation of the Oak Openings Region is important to you. Your opinions are valued locally and may contribute to greater local land protection and park access.

In all cases, governmental and non-governmental entities work cooperatively with willing sellers to reach mutually agreeable terms for acquisition and easements. This provides a powerful tool for protecting our natural heritage. It should be noted, however, that even protected lands are vulnerable to degradation resulting from invasive species, altered hydrology and overuse by the public.

**LOCAL RESEARCH IS PRESENTED ANNUALLY AT THE OAK OPENINGS RESEARCH FORUM IN TOLEDO, OH**

Scan this QR code to learn more about how you can contribute.
STEWARDSHIP

Green Ribbon Initiative’s Stewardship Subcommittee allows land managers to collaborate on restoring natural habitats through the removal of invasive species, the safe and responsible application of prescribed fire, planting of locally native species and the restoration of natural hydrology. Our ambitious goal is to restore sufficient habitat to sustain the region’s full range of plants and animals. Adopting shared goals and developing best management practices has helped managers to put their efforts into a broader context. This coordination also resonates with funders who appreciate a comprehensive, regional approach.

Private landowners play an important role in stewardship because over 95% of the region is privately owned. The Green Ribbon Initiative Landowner Registry Program and Interagency Restoration Team, which conducts restoration throughout the region, were developed to help landowners learn about the habitat on their property and to overcome barriers to managing it. Private backyard habitats increase connectivity among conserved lands, contribute to the size and health of regional populations, and raise landowners’ awareness of the amazing variety of life on their property. Registry members can enroll in training, receive a “Proud to Live in the Oak Openings” yard sign, and often become ambassadors for the region. There is simply no way to sustain the incredible ecosystem we inhabit without the help of thousands of individuals working to improve natural habitat in their own backyards.

Anyone can be a land steward—even if you don’t own land, you can contribute by volunteering at a stewardship workday with one of the Green Ribbon Initiative partners. Virtually all of the GRI partners have regularly scheduled workdays and the collective impact of this work is astonishing. Together, public and private partners have restored over 4,500 acres of rare natural communities in the past ten years! This work makes our parks and preserves more beautiful and more valuable to the nature that lives here. Learn more about how you can be a land steward in Chapter 11!

Volunteers play a large role in managing preserves.
Protecting the Oak Openings Region can seem a daunting task.

Over 70% of landscape has been developed or is in agriculture, leaving less than 30% in natural cover. Fortunately, there are many organizations and individuals driven to protect this unique landscape, as described in Chapter 9. However, the resources and time that each organization or person can devote to the cause are limited, and therefore the Green Ribbon Initiative recognizes the need to work in priority areas across the landscape. By targeting conservation actions within priority areas, Green Ribbon Initiative members can more efficiently protect the unique plants and animals of the region.

Unfortunately, protecting all of the remaining high quality areas of the Oak Openings is not sufficient to preserve the integrity of these communities or the services they provide in the long-term. Often, the remnants are very small, which renders them more vulnerable to threats such as disease, changes in water levels or invasive species. For example, if an invasive plant species is introduced to a very small Mesic Sand Tallgrass Prairie remnant, the entire remnant could be quickly degraded if the invasive plant is not immediately found and removed.

Therefore, because of the many limitations faced by high quality remnants, the restoration of degraded habitat near or between these remnants is critical. When carefully planned, restored habitat can act as corridor along which rare species can travel among remnants. Most species benefit when individuals can occasionally move from one population to another, bringing new genes, and traits, with them. Additionally, restoring degraded habitat can provide opportunities for extirpated species to return.

To begin, protecting the few remaining high quality patches is critical because so much of the Oak Openings has been severely degraded. These patches, called remnants, are home to the region’s last remaining populations of lyre-leaved rock-cress, four-toed salamanders, lark sparrows, frosted elfin butterflies and other species that make this area unique. If these last holdouts are not protected or maintained in high quality condition, we risk losing these species from the area entirely. Already, we have lost over 30 species of plants, seven species of reptiles and amphibians, and seven species of birds from the region. When we protect the remaining high quality areas, the plants and animals within them can disperse to new areas as they are restored, expanding their populations. Therefore, the protection of high quality areas can help make restoration at nearby areas more successful.
When restoring degraded lands, it is important to select areas that will provide a benefit to many species once restored. Otherwise, we risk sinking resources into areas that may support very few—or even no—species critical to Oak Openings’ communities. To address this, Green Ribbon Initiative supported a project to locate exactly where restoration would be most effective.

First, the Green Ribbon Initiative Science Subcommittee selected a suite of species that require healthy Oak Openings plant communities for their survival. These species, called indicator species, can indicate where high quality habitat remains. For example, where you find the federally endangered Karner blue butterfly, you are likely to find high quality Black Oak/Lupine Barren that is home to many other species requiring similar habitat.

Next, these same Subcommittee members identified the habitat requirements of each indicator species. Project leaders then used a computer mapping program to show where some or all of these habitat requirements were already being met. The result is referred to as the Oak-Openings Ecological Model and can be viewed on the Green Ribbon Initiative website.

Areas that met all of the indicator species’ habitat requirements were places that were already in good condition, such as portions of managed parks and preserves. These places may simply require low-intensity maintenance to retain their high quality and continue hosting populations of indicator species. Areas that met some of these habitat requirements were most likely to benefit an indicator species after moderate amounts of restoration.

Habitat requirement maps were then overlaid to determine where the greatest number of species would benefit from restoration. Other sources, such as Michigan’s biodiversity planning process, also contributed to this process. The Green Ribbon Initiative Science Subcommittee members then outlined these areas on the map, selecting them as Priority Conservation Areas (PCAs). Not surprisingly, these areas often aligned with areas that conservation agencies had previously targeted for conservation. In many other cases, however, new hotspots of restoration potential were revealed.

As a result, the Green Ribbon Initiative now has a detailed map that can help conservation agencies and volunteers. Given that the majority of the Oak-Openings is privately owned, private landowners play an important role in protecting and restoring these areas. In what Priority Conservation Area do you reside, or which is your favorite to visit?

There are many ways to support conservation in areas important to you and to targeted wildlife. Chapter 11 provides guidance to those who wish to be a part of this movement. With collaboration and targeted efforts, we can all contribute to building our Green Ribbon.
COMBINING FORCES TO PROTECT THE OAK OPENINGS: HOW TO SAVE THE OAK OPENINGS

BY MICHELLE GRIGORE, P.H.D.

CHAPTER ELEVEN

THERE IS SOMETHING NEW TO DISCOVER ON EVERY OAK OPENINGS HIKE

You are obviously interested in the Oak Openings Region, or you wouldn’t have gotten this far into the guide.

The first chapters introduced the unique plants, animals and communities that make the Oak Openings home to hundreds of rare and endangered species. If you read Chapter 8, you also know that these species are in danger from invasive plants, habitat loss, ditching, drainage, and urban sprawl. This chapter will give you practical tips for helping to conserve and perhaps reintroduce Oak Openings specialties to your property.

The majority of the Oak Openings Region is in the hands of private landowners. As one of those owners, I take the responsibility for preserving the Oak Openings for the future very seriously. I have seen rare animals, like the Karner blue butterfly, disappear from within the preserves that were set aside to protect it. I know that the future of the Region depends on many private citizens, like myself, working with the conservation agencies that compose the Green Ribbon Initiative. They can’t do it alone; there is too little land set aside and too many demands on their limited resources. How can a private landowner help save the Oak Openings? There are several things you can do, including:

• Managing your property for existing Oak Openings habitat
• Creating new habitat through seeding and planting
• Registering significant parcels through the Oak Openings Registry
• Volunteering to help in the nature preserves
• Educating your neighbors about their critical role in preserving the Oak Openings
• Considering a conservation easement

MANAGING YOUR PROPERTY

You may already have significant Oak Openings habitat on your property, but the pressures from adjacent parcels, woody growth and invading exotic plants will rapidly diminish its conservation value. Cutting or chemically treating woody shrubs and exotic plants annually (see Chapter 8) is critical for maintaining the open prairies and barrens of the Oak Openings. Oak savannas also need selective cutting of under story growth if no fire has been through the woods. As a private homeowner, your chance of using fire as a management tool is slim. Will I leave that to the major preserves and trained personnel. But anyone can grab a mower, a set of loppers or an axe and make short work of the woody plants that fire would normally eliminate.

Some plants, like the Russian olive shrub in my home prairie, just keep sprouting back after cutting. Here, you can apply an herbicide labeled for woody plants (like glyphosate, triclopyr or dicamba) to the leaves or cut stump of undesirable plants. Follow the instructions on the label and be sure to wear protective clothing and chemical resistant gloves. In some cases, where Canada thistle is the plant to remove, you may have to resort to a “broad leaf weed killer” which has 2,4-D as an active ingredient. This chemical lasts longer in the environment than glyphosate and may be harmful to humans and pets if used improperly, so use it judiciously and follow the instructions on the label. The focus when using herbicides is to apply one that will have minimal environmental impact, is labeled as effective on the species you want to kill, and to use an application method that doesn’t spread herbicide to surrounding desirable species or waterways.

If you have wet prairie areas on your property, don’t add ditches to the site that will carry the precious water away. You are fortunate to have a tiny portion of what was once a vast wetland in the Oak Openings. Depending on the site conditions, you may be able to encourage water to stay longer on the site and create the important wetland conditions necessary for amphibians, spotted turtles and wet prairie plants.

CREATING NEW HABITAT

There is a science called “Restoration Ecology” that deals with creating natural habitat like prairie, barrens and oak savanna. Through many years of study, well-documented techniques have been developed and outlined in publications like “The Tallgrass Restoration Handbook” by Heckard and Muhlb ("Planting the Seed: A Guide to Establishing Prairie and Meadow Communities in Southern Ontario") which can be found online.
A rain garden collects and filters rainwater while also adding color to your yard.

You can also see a great Oak Openings home demonstration garden and get information on how to create one at Kitty Todd Natural Preserves. As a brief summary, you need to consider the following as you create Oak Openings habitat on your property:

1. How do you eliminate the existing plant cover? If there are lots of bare sand areas, you may be able to place seed or plants directly into the existing plant cover to establish your new habitat (called inter-seeding). Otherwise, you’ll need to remove or turn over the existing sod cover or kill it with a chemical herbicide (bare ground method). The bare ground you create will be a haven for seed weeds, and you’ll have them grow thinly in the first few years.

2. How do I control weeds in the first years of restoration? A prairie will take three to five years to become established. During that time, you almost certainly need to provide some weed control by mowing in the spring at 12 inches above the ground or chemically treating areas with nonionic weeds like Canada thistle. If you mow in June, you’ll cut off some of the prairie plants that you want to establish. They typically grow June - August, although some species, like lupine, may start their growth in April, and others like gentians, may finish their growth in October.

3. Where do I get the plants for my restoration? If you are in the Oak Openings, especially if you are near a nature preserve or in a connecting corridor to a nature preserve, you need to get local plants and weeds to conserve our special plants. Prairie seed from Illinois or Wisconsin may not contain the unique genetic codes that our local Oak Openings plants have. Check the Appendix for local sources of seed and plants. Please DO NOT take them from the preserves.

4. How do I plant a prairie? Seed can be spread by hand or machine in spring or late fall right on the surface of the bare ground or placed carefully between existing plants if inter-seeding. Plants can be purchased as small “plugs” and placed like any garden plant, although a long-handled bulb planter makes big job easier on the back. A cover crop of annual grass or oats is usually planted with the prairie seed to reduce weed growth the first year or so.

5. What about the Oak Opening animals and insects? If you create habitat, they will come. Butterflies, moths, reptiles and amphibians, grassland birds and common mammals have all moved into the restored prairie at my home. They are often waiting on the fringe, looking for new habitat to live in as and common mammals have all moved into the restored prairie at my home. They will come. Butterflies, moths, reptiles and amphibians, grassland birds and common mammals have all moved into the restored prairie at my home. They will come. Butterflies, moths, reptiles and amphibians, grassland birds and common mammals have all moved into the restored prairie at my home. They will come.
The only thing more diverse than the region’s plant and animal communities is the list of parks and activities to explore. Mark the experiences as you enjoy them, and add your own!
**MAUMEE STATE FOREST**

The Maumee State Forest is the only state forest in northwest Ohio. It is composed of many parcels throughout Lucas, Fulton, and Henry counties. The area contains hardwood forest, swamp forest, pine forest, and wet prairie.

Agency: Ohio Department of Natural Resources - Division of Forestry

Experiences:
- Take photos of frogs and turtles in vernal pools throughout the forest.
- Take your home for a ride along eight miles of bridle trails.
- Witness the rare native bloom of blazing star at the mink farm, located at 5544 County Rd. 62, Liberty Center, OH 43532

**IRWIN PRAIRIE STATE NATURE PRESERVE**

The 226 acre Natural Preserve is a mosaic of distinctive plant communities based on variations in soil water tables. The core is the finest remaining wedge meadow in the state dominated by several species of sedges, rushes and wetland grasses.

Agency: Ohio Department of Natural Resources - Division of Parks and Natural Resources

Experiences:
- See sandhill cranes and blue heron hunting frogs in May.
- Listen to deafening chorus frog on an April night.
- See how many plants from this book you can identify in Ohio’s finest wedge meadow.

**LOU CAMPBELL STATE NATURE PRESERVE**

Named after a local naturalist and outdoor writer, this 210-acre preserve features a surprising variety of habitats including wet sedge meadows, swamp forest, sand dunes, sand barrens, prairie and oak openings.

Agency: Ohio Department of Natural Resources - Division of Parks and Natural Resources

Experiences:
- Walk on the dock to watch ducks dabble on the pond.
- Explore the life in numerous vernal pools.
- Enjoy a serene view from under massive oaks while northern blue flag iris bloom in the spring.

**SIBLEY PRAIRIE NATURE PRESERVE - WEST RD. PRAIRIE**

This rare 35 acre preserve gives you a glimpse of the Sibley Prairie, which is now statewide for its incredible plant diversity. This is the only area you will find where water levels allow, and allow you to explore wet prairie and wooded wetlands.

Agency: Southeast Michigan Land Conservancy

Experiences:
- Watch colorful dragonflies hunt for insects to eat. What are they catching?
- Search for gray tree frogs among the oaks.
- Look for bickering star anducker root blooming in this rare sedge meadow.

**KITTY TODD PRESERVE**

It feels like stepping back in time to visit the Kitty Todd Preserve and see the pristine wet prairie and oak savanna. Established in 1976 to preserve some of the highest quality remaining Oak Openings habitat, the 1,060 acre preserve is the heart of conservation in the region. The preserve gate is open during business hours, but the trails may be accessed during all daylight hours.

Agency: The Nature Conservancy

Experiences:
- Watch red-headed woodpeckers glide through the savanna.
- Enjoy a family picnic at the Bill Sullivan Memorial Pavilion.
- Make a difference by volunteering to restore this globally rare ecosystem.

**SYLVAN PRAIRIE PRESERVE**

Syvan Prairie Park is 120 acres of woodlands. This park is being rehabilitated into meadow and wetlands. It boasts bike riding on the 5.5 mile quarry ridge trail, playground and fishing in 2 small lakes.

Agency: The Oldeans Parks System (TOPS)

Experiences:
- Come sledding in the winter.
- See the beaver lodge in Willow Lake.
- Watch fireworks on a summer night.

**CROSSWINDS MARSH INTERPRETIVE PRESERVE**

Crosswinds Marsh is a man-made wetland built to replace wetlands that were paved over during the Detroit Metro Airport’s expansion in the mid-1990’s. The park contains several miles of hiking and equestrian trails. Additionally, a boardwalk extends across the marshes and is a great place from which to fish and watch wildlife and sunsets.

Agency: Wayne County Parks

Experiences:
- Hike seven miles of nature trails.
- Fish for bass, channel catfish, and sunfish with your kids.
- Watch the resident pair of bald eagles.

**WHITEFORD TOWNSHIP COMMUNITY PARK**

In addition to baseball diamonds, the park contains a 14-acre natural area of unique clay/limestone prairie unlike any found elsewhere in the region.

Agency: Whiteford Township

Experiences:
- Attend Community Days on the second weekend of September.
- Search for rare Oak Openings birds, such as the blue grosbeak.
- See towering chinquapin oaks.

**EXPLORE, LEARN, AND PLAY IN THE OAK OPENINGS**

- **JOHN HIRSCH MEMORIAL MARSH**
  - Located between I-75 and the Scioto River.
  - Enjoy a hike on the 2.5-mile trail.

- **WINTERTHUR PRAIRIE PRESERVE**
  - Located between I-675 and the Scioto River.
  - Watch for the painted turtle.

- **FEN ROAD PRAIRIE**
  - Located near the I-675 and US-23 intersection.
  - Look for the yellow-billed cuckoo.

- **ROSE HILL MARSH**
  - Located near the Scioto River.
  - Listen for the American woodcock.

- **TAKING PART IN THE OAK OPENINGS**
  - Volunteer to help restore this globally rare ecosystem.

- **THE NATURE CONSERVANCY**
  - Support conservation efforts in the Oak Openings.

- **AIRPORT PARK**
  - Located near the Dayton International Airport.
  - Watch for sandhill cranes.

- **DAYTON-OAK庫R PARK**
  - Located near the I-675 and US-23 intersection.
  - Search for the American white ibis.

- **DAYTON HOME FIELDS**
  - Located near the I-675 and US-23 intersection.
  - Witness the mid-summer bloom of blazing star.

- **SANDHILL CRANE PRESERVE**
  - Located near the Scioto River.
  - Observe the sandhill cranes from the observation deck.

- **ROSE HILL MARSH**
  - Located near the Scioto River.
  - Enjoy a picnic on the dock.

- **GREEN NEST PRAIRIE**
  - Located near the I-675 and US-23 intersection.
  - Watch for the blue Grosbeak.

- **WHITEFORD TOWNSHIP COMMUNITY PARK**
  - Located near the I-675 and US-23 intersection.
  - Search for rare Oak Openings birds, such as the blue grosbeak.

- **CROSSWINDS MARSH INTERPRETIVE PRESERVE**
  - Located near the I-675 and US-23 intersection.
  - Watch for the red fox.

- **WHITEFORD TOWNSHIP COMMUNITY PARK**
  - Located near the I-675 and US-23 intersection.
  - Search for rare Oak Openings birds, such as the blue grosbeak.

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## CONTACT LIST

Below are agencies involved in the protection and restoration of Oak Openings habitat and the education of its residents and visitors.

Many of these agencies perform additional conservation work outside of the Oak Openings. The checklist below reflects the type of work conducted within the bounds of this great region. Use this list to find the appropriate contact for your needs, such as contracting restoration on your property or donating a conservation easement.

### GRI INVOLVEMENT:
- **S** = Steering committee
- **M** = Formal member
- **W** = Working group/subcommittee
- **P** = Partner

### STATES SERVED
- **Ohio**
- **Michigan**

### AGENCY | PRIVATE | PUBLIC | KIDS CONSERVATION ACTIVITIES | EASEMENTS & CONSERVATION ESTATE ACTIVITIES | RX FIRE | HABITAT RESTORATION | CONSERVATION & RESTORATION EDUCATION | RESEARCH & DEVELOPMENT | OPERATIONS MANAGED | CONTACT
--- | --- | --- | --- | --- | --- | --- | --- | --- | --- | ---
Black Swamp Bird Observatory | S | X | X | | | | | | | 13551 W. State Route 2, Oak Harbor, OH 43449 | 419.898.4070
Black Swamp Conservancy | S | X | X | | | | | | | P.O. Box 332, Perrysburg, OH 43552 | 419.833.3231
Boiling Green Parks and Recreation | M | X | X | | | | | | | 245 W. Newton Rd., Boiling Green, OH 43402 | 419.354.6223
Boiling Green State University | M | | | | | | | | | (866)1, Boiling Green, OH 43402 | 419.372.2571
Huron Clinton Metroparks | M | X | X | X | | | | | | 82000 High Ridge Drive, Brighton, MI 48114 | 810.227.2275
Lucas County Soil and Water Conservation District | P | X | X | X | X | X | | | | BGSU, Bowling Green,OH 43403 | 419.372.2571
Metroparks of the Toledo Area | S | X | X | X | | | | | | **32000 High Ridge Drive, Brighton, MI 48114** | 810.227.2275
Michigan Dept of Environmental Quality | X | X | X | X | | | | | | | | 810.227.2275
Michigan Dept of Natural Resources and the Environment | M | X | X | X | | | | | | **32500 Hudson Rd., Rockwood, MI 48173** | 734.379.9692
Michigan Nature Association | M | X | | X | | | | | | 37201 Science Parkway, Ste 150, Canton, MI 48184 | 734.375.5701 or 866.375.2351
Natural Resources Conservation Service (NRCS) | W | X | | | | | | | | 3901 W. Central Ave, Toledo, OH 43606 | 419.407.3071
Nature’s Nursery | S | X | X | | | | | | | 37201 Science Parkway, Ste 150, Canton, MI 48184 | 734.375.5701 or 866.375.2351
Oak Openings Region Conservancy | S | X | X | | | | | | | | | | 37201 Science Parkway, Ste 150, Canton, MI 48184 | 734.375.5701 or 866.375.2351
Ohio Bird Conservation Initiative | M | | | | | | | | | | | | 38089 County Rd. 1, Archbold, OH 43502 | 419.446.1775
Ohio DNR - Division of Forestry | S | X | X | X | | | | | | **3901 W. Central Ave, Toledo, OH 43606** | 419.407.3071
Ohio DNR - Division of Natural Areas and Preserves | S | X | X | X | | | | | | **3901 W. Central Ave, Toledo, OH 43606** | 419.407.3071
Ohio Prairie Association | P | | | | | | | | | | | | 38089 County Rd. 1, Archbold, OH 43502 | 419.446.1775
Ohio State University - Lucas County Extension | W | X | | | | | | | | **3901 W. Central Ave, Toledo, OH 43606** | 419.407.3071
Partners for Clean Streams | | | | | | | | | | | | 3901 W. Central Ave, Toledo, OH 43606 | 419.407.3071

*Excluding conservation easements  ** Upon request

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**IRWIN STATE NATURE PRESERVE IS ONE OF MANY PLACES TO WATCH BEAUTIFUL SUNSETS IN THE OAK OPENINGS**

T. CRAIL

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**GRI INVOLVEMENT:**
- **S** = Steering committee
- **M** = Formal member
- **W** = Working group/subcommittee
- **P** = Partner

**STATES SERVED**
- **Ohio**
- **Michigan**
APPENDIX OAK OPENINGS

<table>
<thead>
<tr>
<th>AGENCY</th>
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<th>PUBLIC</th>
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<td>Toledo-Lucas County Sustainability Program</td>
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*Excluding conservation easements*

**Blue Lupine and Plains Puccoon**

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**Sunset over Irwin Prairie State Nature Preserve**

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**T. Craig**
REFERENCES AND ADDITIONAL RESOURCES


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Mayfield, H. 1976. Changes in the Natural History of the Toledo Region Since the Coming of the White Man. Toledo Metropolitan Park District. 5700 W. Central Ave, Toledo, OH.

Green Ribbon Initiative, www.oakopenings.org


ACKNOWLEDGEMENTS

This guide would not be possible without the contributions, input, and guidance from the following:

Authors, each of whom is a respected expert in Oak Openings flora, fauna, or conservation

Michelle Grigore, regional expert who crafted the first and second editions of the guide, and provided input and resources critical to the third edition

The Green Ribbon Initiative steering committee and others (for helping to shape the new edition and conducting final review: Steve Woods (chair), Kent Bekker, Sarah Blokamp, Rick Bryan, Erika Burt, Melanie Coulter, Michelle Grigore, Kim Kaufman, Bob Kran, Hal Mann, Tim Schetter, Don Schmenk, and Ryan Schroeder

Lindsey Reimartz, Green Ribbon Initiative Partnership Specialist, who provided a variety of resources and recommendations to ensure this update reflected the needs and preferences of Oak Openings landowners


Book design: MadHouse Creative, LLC, Toledo, OH.